CLAIMS

WE CLAIM:

1. A passive thermal switch assembly, comprising:

a heat pipe having an evaporator end and a condenser end; and

a switch coupled to the heat pipe condenser end, the switch comprised at least partially of a material having a shape or volume that varies with temperature.

2. The switch assembly of Claim 1, wherein the switch comprises:

a first thermally conductive contact coupled to the heat pipe condenser end; and

a second thermally conductive contact disposed proximate the first thermally conductive contact.

3. The switch assembly of Claim 2, wherein the first and second thermally conductive contacts are selectively thermally coupled and thermally decoupled from one another in response to variations in temperature of either or both of the contacts.

4. The switch assembly of Claim 2, wherein the first and second thermally conductive contacts at least partially engage one another when at least a portion of the first thermally conductive contact reaches a predetermined temperature.

5. The switch assembly of Claim 2, wherein:

the first thermally conductive contact is comprised of a shape memory metal or shape memory metal alloy; and

the second thermally conductive contact is comprised of a non-shape memory metal or metal alloy, and is at least partially surrounded by at least a portion of the first thermally conductive contact.

6. The switch assembly of Claim 2, wherein:

the first thermally conductive contact is comprised of a non-shape memory metal or metal alloy; and

the second thermally conductive contact is comprised of a shape memory metal or shape memory metal alloy, and is disposed adjacent the first thermally conductive contact.

7. The switch assembly of Claim 6, wherein the first and second thermally conductive contacts are selectively thermally coupled and thermally decoupled from one another in response to variations in temperature of either or both of the contacts.

8. The switch assembly of Claim 6, wherein the first and second thermally conductive contacts selectively engage one another, at least partially, in response to variations in temperature of either or both of the contacts.

9. The switch assembly of Claim 2, further comprising:

one or more conductive links, each conductive link having a first end coupled to the first contact and a second end adapted to couple to a substantially fixed structure,

wherein each conductive link is comprised of a shape memory metal or metal alloy.

10. The switch of Claim 2, wherein:

the first thermally conductive contact is comprised of a first metal having a first temperature coefficient of expansion; and

the second thermally conductive contact is comprised of a second metal having a second temperature coefficient of expansion that is different from the first temperature coefficient of expansion, and at least partially surrounds at least a portion of the first thermally conductive contact.

11. The switch assembly of Claim 10, wherein the first and second thermally conductive contacts selectively engage one another, at least partially, in response to variations in temperature of either or both of the contacts.

12. The switch assembly of Claim 10, wherein the first and second thermally conductive contacts at least partially engage one another when at least a portion of the first thermally conductive contact reaches a predetermined temperature.

13. The switch assembly of Claim 1, wherein the material is a shape memory alloy.

14. The switch assembly of Claim 13, wherein the shape memory alloy is selected from the group consisting of nickel-titanium, copper-zinc-aluminum, and iron-manganese-silicon.

15. The switch assembly of Claim 1, wherein switch is comprised of two metals having different thermal coefficients of expansion.

16. The switch assembly of Claim 15, wherein the two metals are selected from the group of pairs consisting of aluminum and nickel, zinc and nickel, zinc and aluminum, copper and iron, copper and molybdenum, and aluminum and iron.

17. An electronic equipment enclosure, comprising:

a chassis;

one or more circuit components housed within the chassis;

one or more heat pipes each having an evaporator end and a condenser end, each heat pipe evaporator end coupled to at least one of the circuit components; and

one or more switches coupled to each heat pipe condenser end, each switch comprised at least partially of a material having a shape or volume that varies with temperature and disposed adjacent the chassis, whereby each switch is selectively thermally coupled to, and thermally decoupled from, the chassis at a predetermined temperature.

18. The system of Claim 17, wherein each switch comprises:

a first thermally conductive contact coupled to the heat pipe condenser end; and

a second thermally conductive contact disposed proximate the first thermally conductive contact.

19. The system of Claim 18, wherein the first and second thermally conductive contacts are selectively thermally coupled and thermally decoupled from one another in response to variations in temperature of either or both of the contacts.

20. The system of Claim 18, wherein the first and second thermally conductive contacts at least partially engage one another when at least a portion of the first thermally conductive contact reaches a predetermined temperature.

21. The system of Claim 18, wherein:

the first thermally conductive contact is comprised of a shape memory metal or shape memory metal alloy; and

the second thermally conductive contact is comprised of a non-shape memory metal or metal alloy, and is at least partially surrounded by at least a portion of the first thermally conductive contact.

22. The system of Claim 18, wherein:

the first thermally conductive contact is comprised of a shape memory metal or shape memory metal alloy; and

the second thermally conductive contact is comprised of a non-shape memory metal or metal alloy, and is disposed adjacent the first thermally conductive contact.

23. The system of Claim 22, wherein the first and second thermally conductive contacts are selectively thermally coupled and thermally decoupled from one another in response to variations in temperature of either or both of the contacts.

23. The system of Claim 22, wherein the first and second thermally conductive contacts selectively engage one another, at least partially, in response to variations in temperature of either or both of the contacts.

24. The system of Claim 18, further comprising:

one or more conductive links, each conductive link having a first end coupled to the first contact and a second end adapted to couple to a substantially fixed structure,

wherein each conductive link is comprised of a shape memory metal or metal alloy.

25. The system of Claim 18, wherein:

the first thermally conductive contact is comprised of a first metal having a first temperature coefficient of expansion; and

the second thermally conductive contact is comprised of a second metal having a second temperature coefficient of expansion that is different from the first temperature coefficient of expansion, and at least partially surrounds at least a portion of the first thermally conductive contact.

26. The system of Claim 25, wherein the first and second thermally conductive contacts selectively engage one another, at least partially, in response to variations in temperature of either or both of the contacts.

27. The system of Claim 25, wherein the first and second thermally conductive contacts at least partially engage one another when at least a portion of the first thermally conductive contact reaches a predetermined temperature.

28. The system of Claim 17, wherein the material is a shape memory alloy.

29. The system of Claim 28, wherein the shape memory alloy is selected from the group consisting of nickel-titanium, copper-zinc-aluminum, and iron-manganese-silicon.

30. The system of Claim 17, wherein switch is comprised of two metals having different thermal coefficients of expansion.

31. The system of Claim 30, wherein the two metals are selected from the group of pairs consisting of aluminum and nickel, zinc and nickel, zinc and aluminum, copper and iron, copper and molybdenum, and aluminum and iron.